Serial No. 10/820,317
Docket No. VSTI-10U

Amendment to the Specification:

Please replace the first paragraph on page 1 with the following rewritten paragraph:

--This application claims the benefit of U.S. Provisional Patent Application Serial No. 60/461,725, filed April 10, 2003 ~~and~~ which is hereby incorporated by reference in its entirety.--

Please replace the paragraph beginning at page 2, line 5, with the following rewritten paragraph:

--In other systems, referred to as assist-type systems, the vapor is pumped from the vehicle tank and forced into the storage tank by a vapor recovery system connected to the vapor hose. One example of an assist vapor recovery system is described in U.S. Patent No. 6,095,204 issued to Healy and hereby incorporated by reference. Currently, many fuel dispensing pumps at service stations are equipped with vacuum assisted vapor recovery systems that collect fuel vapor vented from the fuel tank filler pipe during the refueling operation and transfer the vapor to the fuel storage tank. Assist type vapor recovery systems use a vapor pump to "assist" in the collection of vapors generated during vehicle refueling.--

Please replace the paragraph beginning at page 2, line 16, with the following rewritten paragraph:

--One criteria of the performance of the fuel dispenser is the ratio of the vapor or air being recovered and returned to the underground storage tank (UST) to the fuel or liquid being pumped from the UST to the vehicle. However, certain variables may affect the valve of the air-to-liquid (A/L) ratio and these variables need to be accounted for to provide a consistent and reliable refueling operation. Typical variables include the

pressure drop of the hose and nozzle, the speed of the pump with varying flow rates, meter outputs from grade to grade, pump wear, etc.--

Please replace the paragraph beginning at page 4, line 10, with the following rewritten paragraph:

--Fig. 1 is an exemplary refueling system for a vehicle according to an ~~one~~ embodiment of this invention; and--

Please replace the paragraph beginning at page 4, line 17, with the following rewritten paragraph:

--Referring to Fig. 1, a vehicle 10 is shown being refueled with a refueling system 12. A nozzle 14 is inserted into a filler pipe 16 of a fuel tank 18 of the vehicle 10 during the refueling operation.--

Please replace the paragraph beginning at page 4, line 20 and bridging pages 4 and 5, with the following rewritten paragraph:

--A fuel delivery hose 20 is connected to the nozzle 14 on one end and to a refueling system dispenser 22 on the opposite end. The refueling system 12 includes an assist-type vapor recovery system 24. As shown by the cut-away view of the interior of the fuel delivery hose 20, an annular fuel delivery passageway 26 is formed within the fuel delivery hose 20 for delivering fuel by a pump 28 from an underground storage tank (UST) 30 to the nozzle 14. A central, tubular vapor passage 32 as part of the vapor recovery system 24 is also within the fuel delivery hose 20 for transferring fuel vapors expelled from the vehicle's tank 18 to the UST 30 during the refueling of the vehicle 10. The fuel delivery hose 20 is depicted as having the internal vapor passage 32 with the fuel delivery passage 26 concentrically surrounding it.--

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Please replace the paragraph beginning at page 5, line 9, with the following rewritten paragraph:

--As shown in Fig. 1, the UST 30 includes a vent pipe 34 and a pressure vent valve 36 for venting the UST 30 to the atmosphere. The valve 36 vents the ~~tank~~ UST 30 to air at about ~~3.0 inches H_2O or -8.0 H_2O~~ + 3.0 inches H_2O or -8.0 inches H_2O.--

Please replace the paragraph beginning at page 5, line 12, with the following rewritten paragraph:

--A vapor recovery pump 38 provides a vacuum in the vapor passage 32 for removing fuel vapor during a refueling operation. The vapor recovery pump 38 may be placed anywhere along the vapor recovery system 24 at or between the nozzle 14 and the UST 30. Vapor recovery systems ~~24~~ utilizing ~~the~~ vapor recovery pumps ~~38~~ of the type shown and described herein are well known in the industry and are commonly utilized for recovering vapor during refueling of ~~conventional~~ vehicles which are not equipped with on-board refueling vapor recovery (ORVR) systems ~~(ORVR)~~. A vehicle being refueled ~~The vehicle 10 as shown in Fig. 1 being fueled~~ may include an ORVR system 40, for example as shown in the vehicle 10 of Fig. 1.--

Please replace the paragraph beginning at page 5, line 22 and bridging pages 5 and 6, with the following rewritten paragraph:

--The vehicle fuel tank ~~18~~ of an ORVR equipped vehicle ~~10~~ typically has an associated on-board vapor recovery system ~~40~~. These exemplary ORVR systems ~~s~~ 40 shown in Fig. 1 has ~~typically have~~ a vapor recovery inlet 42 extending into the fuel tank 18. As the fuel tank 18 fills, pressure within the tank 18 increases and forces vapors into the ORVR system 40 through the vapor recovery inlet 42. ~~Alternatively, t~~The ORVR system 40 also may use a check valve (not shown) along the filler pipe 16 to prevent further loss of vapors. One mechanism that may be included in the refueling

system dispenser 22 of this invention to enable the vapor recovery system 24 to accommodate ~~make~~ the ORVR system 40 ~~more compatible with the vapor recovery system 24~~ is disclosed in U.S. Patent ~~Application Serial~~ No. ~~10/684,051, filed October 10, 2003 and hereby~~ 6,810,922 which is incorporated herein by reference in its entirety.--

Please replace the paragraph beginning at page 6, line 10, with the following rewritten paragraph:

--As liquid fuel rushes into the fuel tank 18 during the refueling operation, fuel vapors are forced out of the fuel tank 18 through a spout 44 of the nozzle 14. The vapor recovery system 24 pulls the fuel vapors through the hose 20 along the vapor passage 32 and ultimately into the UST 30. This is the standard operation when refueling vehicles not equipped with ORVR systems.--

Please replace the paragraph beginning at page 6, line 16 and bridging pages 6 and 7, with the following rewritten paragraph:

--According to this invention and as shown in Figs. 2 and 3, ~~assist type~~ assist-type vapor recovery systems 24 use the vapor pump 38 to "assist" in the collection of vapors generated during vehicle refueling. The speed of the vapor pump 38 or rate at which the vapors/air are pulled from the fuel tank 18 may be correlated to an output of a liquid meter, a fuel flow meter 46 as illustrated, measuring the rate of fuel being pumped by the dispenser 22 to the fuel tank 18. An electronic control interface 48, connected between the meter ~~output~~ 46 and the speed control of the vapor pump 38, allows the ratio of vapor/air flow to fuel/liquid flow (A/L ratio) to be adjusted to the desired level. Once this level setting is adjusted, it may be established as a fixed value, which in one embodiment is preferably about 1 .0 (i.e., A/L=1 .0). In many cases, an A/L ratio in the range of 0.95/1.0 to 1.05/1.0 is targeted because precision is often difficult to achieve, especially as the components of the system wear.--

Please replace the paragraph beginning at page 7, line 11, with the following rewritten paragraph:

--According to this invention, a diagnostics agent 50 is introduced for controlling the A/L ratio in vacuum assist vapor recovery refueling system dispensers 22 by utilizing an in-station diagnostics (ISD) system 50a remote from the dispenser 22 but interfaced with the dispenser 22 (Fig. 2) or a dispenser diagnostics system 50b located with the dispenser 22 (Fig. 3). Diagnostics agent 50 monitors the performance of the vapor recovery system 24 according to a number of variables. For example, the diagnostics agent 50 may be configured to monitor the A/L ratio of each dispensing event using a vapor flow meter 52 placed in the vapor line 32 and ~~a~~ the flow meter 46 placed in the fuel supply line 26.--

Please replace the paragraph beginning at page 7, line 21 and bridging pages 7 and 8, with the following rewritten paragraph:

--~~A~~ The control interface 48 in communication with the diagnostics agent 50 enables more precise control of the A/L ratio. Specifically, in one embodiment, the diagnostics agent 50 is in communication with the vapor flow meter 52 via a loop 54 and in communication with the fuel flow meter 46 via a loop 56. A feedback loop 58 from the diagnostics agent 50 through the control interface 48 is provided via a feedback loop 60 to the vapor pump 38 and via a feedback loop 62 to the fuel pump 28. The feedback loops to one or both of the pumps 28, 38 based on the respective flow rates measured by the flow meters 46, 52 enables a more precise control of the A/L ratio.

Please replace the paragraph beginning at page 8, line 13, with the following rewritten paragraph:

--The retrofit of an existing fuel system 12 to accomplish such an improvement is a simple matter of hanging a new nozzle and valve assemble in the fuel system. It

should be appreciated by those of ordinary skill in the art that the retrofit of existing fuel systems is easily accomplished with the implementation and installation of an assembly as described herein. Additionally, the installation of new fuel systems preferably includes an assembly according to this invention.--